Section (19) dealing with *Arbitrariness of Coloration* (viz. the fact that colouring often has no "reference to the somatic importance of organs"). He here speaks of a black Australian bug of the genus *Pirates*, in which the wings of the male and the abdomen of the wingless female are similarly striped and spotted with dirty yellow. "What, then, does this mean? When the pattern was produced, it fell upon the wings of the male, and in the female on the uncovered abdomen."

There is a conspicuous want of method and arrangement in the Sections recognised by the author. Thus the idea of a pattern which persists over the body surface independently of structural features but related to attitude, is the central conception of many of the Sections, and even those as widely separated as (3) is from (18) and (19). It is interesting to compare this point of view with that of the late Alfred Tylor, who ingeniously attempted to show that the true significance of pattern is to be found in its relation to underlying structure. Undoubtedly many patterns possess this relationship, and undoubtedly many others as conspicuously lack it. The facts on which both naturalists relied are certainly right, while their conclusions are as wrong as they are contradictory of each other—Brunner, that pattern is produced upon the organism by some power outside it, and caring nothing for its structural differentiation; Tylor, that there is some deep and significant bond between pattern and underlying structure, so that the former becomes the outward and visible sign of the latter.

The attempt has now been made to give the whole of the "laws which have no connection with the care for the preservation of species" which the author claims to have found. To the majority of naturalists these "laws" will appear to be the grouping of certain markings and patterns according to more or less superficial resemblances between them; and this being done, the real interest now begins—the attempt to ascertain their significance in the lives of their possessors. Much interest, too, awaits a minute investigation of many of the groups in order to make out whether they are based on superficial appearances, and therefore artificial, or whether they are real and natural.

To the author, however, it all means far more than this. As the memoir was being studied, the continual pursuit of detailed metaphor led to the belief that the author did not regard his imagery as metaphor only. In the brief Conclusion he speaks out on the question.

> "In the above paper I have brought into a system the divergent facts of coloration. In so doing, simple principles have been formed which coincide in a remarkable manner with those of the human painters' arts. The agreement is so striking that one is tempted to use the terms of our own technique in descriptions. I speak of splashing, stencil-painting and brush-painting, also of the position of the insect when the colour was applied, of sketching in the pattern in different ways, &c."
>
> "This is figurative language, but the uniformity of the phenomena forces one to the conjecture, that the process in nature is of a similar character; that is to say, a phenomenon which acts from without, independent of the biology of the animal coloured and in nowise connected with its structure."

When we inquire what this power can be, the author replies as follows:—

> "The exact sciences have accustomed us to refer all natural phenomena to the action of definite, inviolable laws. In the coloration of insects, however, we meet with an *arbitrariness* striving to produce attributes without regard for their possessors and, therefore, obviously to be looked upon as the emanation of a Will existing above the universe."

Thus Brunner leads us back to a form of special creation. Paley was convinced by the argument of design; Brunner by the argument of want of design. Most of us, while rejecting both, will distinctly prefer the philosophy of the old theologian to that of the great orthopterist.

The "Will existing above the universe," the Will which Brunner supposes to work out "purposes in creation far more lofty than the mere preservation of the species," is mainly to be recognised by the resemblance of its handiwork to that produced by the methods of the craftsman, and especially by the remarkable likeness which it presents (as in the wrongly-placed stencil pattern) to a poor form of human art, at its worst.

The reasons given for rejecting the Darwinian explanation are indeed remarkable, but far more remarkable are the hypotheses which the objectors prefer to put in its place.

E. B. P.

BLANFORD'S BIRDS OF INDIA.

The Fauna of British India. Birds, Vol. iv. By W. T. Blanford. 8vo. Pp. xxi + 500. (London: Taylor and Francis, 1898.)

THE present volume completes the Vertebrates of the Indian Fauna, and the editor (in this case also the author) is to be congratulated on having thus far so successfully accomplished a very important and at the same time a very difficult task. The volume before us is, perhaps, the most generally interesting of the four devoted to birds, seeing that it treats of groups like the pigeons, the sand-grouse, the game-birds, and the ducks and geese, which claim attention from a wider circle of readers than is attracted by the perching birds and picarians. Since the author, in addition to his scientific qualifications, is also a sportsman who has shot a large number of the species he describes, his work can scarcely fail to prove as acceptable to his brother sportsmen as to scientific ornithologists. Limitations of space have necessarily curtailed the amount of matter devoted to the habits of most of the species, but within such limitations the notices leave little to be desired.

From its geographical situation, India, we need scarcely remind our readers, is visited during the cold season by vast swarms of game-birds and ducks of various kinds; and the fauna of these groups is consequently very much larger than might *à priori* have been expected. Sportsmen accordingly often experience considerable difficulty in identifying the species contained in their "bag," but with the publication of the present volume such difficulties should cease.

Turning to the more strictly scientific aspect of the book, it may be noted that the author is careful to state how much he is indebted to the British Museum Catalogue of Birds, certain volumes of which devoted to several of the groups he describes have appeared at more or less recent dates.

On comparing these volumes of the Museum Catalogue with the work before us, it will be found that in many instances Mr. Blanford has somewhat simplified the classification adopted. This is most markedly the case in the pigeons, the existing members of which were divided by Count Salvadori into five families; whereas Mr. Blanford, so far at least as Indian forms are concerned, admits but one. Although he has not to deal with the former on this occasion, he further suggests that the separation of the *Tetraonidæ* as a family apart from the *Phasianidæ* seems scarcely justifiable by the facts. And on turning to the minor groups, we find a similar wide and comprehensive view taken as to their respective limitations. Leaving out of consideration the very distinct demoiselle crane (*Anthropoides*), it may be noticed as an example of this feature that recent writers have assigned the three species of true cranes which visit India proper to as many distinct genera, respectively distinguished, mainly, if not entirely, by the comparatively insignificant character of the extent to which the head is clothed with feathers. All the three species are indeed structurally similar and essentially the same type of bird, and to many at least it will be a source of satisfaction to find them once again reinstated in the original genus *Grus*. Possibly a further improvement would have been to have placed the Burmese representive of the Sarus crane of India as a sub-species rather than a species, but this is a matter of detail.

In museum work (as in stamp-collecting) there seems to be an inevitable and inherent tendency on the part of specialists to go on refining and discriminating in the detection of small points of difference, and thus to raise the individuals or groups in which such minute points of difference occur to a higher and higher rank. And in consequence of this extremely natural ultra-refinement (due to a ripe knowledge of minuteness of detail), the mutual affinities of animals tend to become obscured or even lost, while the science is cumbered with an excess of more or less superfluous terms. It is therefore a distinct advantage when a man with the wide experience and knowledge derived from the study of other groups, possessed by the author of the present volume, sets himself the task of revising the classification of a group which has occupied the attention of a large number of specialists. And whatever may be the opinion from the specialist point of view, it can scarcely be doubted that to naturalists who desire to take a broad and comprehensive view of zoological affinities, Mr. Blanford's simpler arrangement is decidedly preferable to the numerous sub-divisions adopted by some of his fellow workers.

As regards the general classification adopted, it is gratifying to notice that it has not been considered necessary by the author that he should propose any new scheme; and the various major groups accordingly, for the most at any rate, appear under the old familiar names. In some instances, however, generic terms in common use have had to be rejected on account of priority or preoccupation, and a few birds consequently appear under unfamiliar titles. The horned pheasants, for example, figure as *Tragopan* in place of *Ceriornis*, but since the former name is often used as the popular title of these birds, the change in this case is less startling than usual. As in all those made by the author, this substitution was a necessity according to the rules of nomenclature.

The total number of Indo-Burmese birds regarded as entitled to rank as distinct species in the four volumes devoted to the group is given by the author as 1626. Years ago, from a much smaller area, Jerdon recognised 1016. In Mr. Hume's catalogue of 1879 a total of 1788 entries were recorded, but of these 106 were rejected as invalid, and 74 regarded as doubtful, thus leaving a total of 1608, or very nearly the same as the number admitted by Mr. Blanford and his fellow author Mr. Oates. Since a large number of new species have been described of late years, this indicates that due attention has been given on the part of ornithologists to the elimination of nominal ones. An exact estimation of the number of species of any group of animals inhabiting a particular country must, however, depend to a considerable extent on the personal equation of the describer. As the author well observes:—

> "The precise number of species is naturally dependent on a personal factor, some writers being more liberal than others in admitting the claims to specific rank of races which are distinguished by small differences of plumage or measurement, or which are connected by intervening links with the typical form. Such races or sub-species, as they are called, have not, as a rule, been separately numbered and described in the present work, but they have received due notice and their characters have been explained."

From this it would appear that Mr. Blanford has not yet brought himself to accept the principle of trinomialism for birds, although his recent paper on the large Indian squirrel seems to show that he has already done so in the case of mammals; and the innovation would, to our thinking, be an advantage among the former.

As is always the case with the author's work, his descriptions are most accurately and concisely written, and they all bear the impress of having been drawn up afresh from the birds themselves, and not merely extracted and furbished up from the writings of others. In many of the groups described, and especially the game-birds, the females are so different in plumage from the males, as to require a description nearly as long as that devoted to the latter, so that the labour involved in the work is almost double that which might at first sight be supposed necessary. Equally exact, and at the same time important, are the details given in connection with the geographical range of the genera and species; a subject too often neglected by the earlier writers.

One thing we should like to suggest to the author, and that is that in future works he should give the reference to the place of publication of the generic names and their synonyms, instead of merely citing the author and date. The characters of the eggs in each genus might also have been added; while a few more details regarding the nesting habits of some of the more important species would, if space permitted, have added to the interest of the book.

Many books on Indian game-birds and the kindred groups are already in existence, and a new one on a small scale is now in course of publication; but it may be safely said that as a work of reference, embodying all the important information regarding these groups, the present volume will long remain the standard, both to the naturalist and to the sportsman. While lacking the advantage of plates, it has the compensations of portability, accuracy, and completeness; and it forms a worthy companion to its fellow volumes of the same series.

R. L.

NAVIGATION AND CYCLONES.

Méthode pour abréger les traversées en utilisant les perturbations de l'Atmosphère. Par M. A. Fieron, capitaine de frégate. Pp. 91. (Paris: Imprimerie Nationale, 1891.)

THIS little book bears the date 1891, and is extracted from the *Annales hydrographiques* of that year. The object of the author, who was attached to the *Calédonien*, and thus had considerable experience of the Southern Seas and of the weather prevalent in those latitudes, is to indicate methods by which navigation may be facilitated and the duration of voyages, in sailing ships especially, diminished by taking advantage of the cyclonic and anticyclonic movements in the atmosphere. By so manœuvring that the violence of the storm is utilised in carrying the ship in the direction desired, it is contended that these destructive agents can be turned to useful account. It may be true, as the author asserts, that in every area of low pressure there is always one part which can be made useful—one sector in which favourable winds will be found. But careful navigators are rather prone to give these areas of disturbance a wide berth; and it speaks much for the trustfulness of the author, and of the calm confidence in which he reposes on scientific deductions, that he does not propose to avoid these dreaded cyclonic storms, but is prepared to steer into their midst and make their violence subservient to his ends. His system is based upon instrumental observations, chiefly of the barometer, from which may be learnt the direction and force in which the cyclone is moving. Experience teaches the behaviour of the atmosphere in a region of low pressure in different latitudes, and by the aid of a few rules, easily learnt and remembered, it is not difficult to perceive whether one be on the navigable or dangerous side of a cyclone, and arrange accordingly. The author therefore gives in very considerable detail, the condition of the weather, the direction of the wind, and the appearance of the sky, which may be expected in the various positions in which the ship finds itself relative to the centre of the storm.

We have practically to do with a system of weather forecasting, based upon knowledge which cannot always be exact or sufficient, and therefore it would seem must sometimes lead astray. But the author declares that he has never been in error, and that he has never had any hesitation in selecting the proper route which would enable him to find the most favourable wind to carry him most swiftly in the direction he desired to travel. He is, however, careful to add that his rules for observance apply only on the open ocean, where land masses do not interfere with the aerial current, and his success may be to some extent due to the employment of the system under the conditions of the greatest simplicity.

This work has been before the maritime public now some seven years, and presumably the procedure has been submitted to frequent test by those who have to navigate in those seas, which have been made the subject of study, but the testimony in its favour does not seem to be overwhelming. Several causes may be assigned to explain the indifference with which the practical suggestions contained in the book have been received by the mariner and the shipowner. The most evident is the steady decline in the tonnage of sailing vessels, and the tendency to convert many of these into floating warehouses containing grain. When a shipowner knows that he will have to pay rent for storage of the cargo on arrival, he is practically indifferent how long the voyage may last, and safety is of greater consideration than swiftness. The recognition of trade routes and the maintenance of particular lines of navigation pursued by vessels which can both steam and sail, forbid a haphazard, self-selected route, which, if it shorten the time of passage, increases the chances of collision. The author, it is true, considers his system particularly applicable to this kind of steamer, employing the steam to carry the vessel into a position in which it would enjoy favourable breezes. A few tons of coal would be well expended, he urges, if it enabled a skipper to bring his steamer alongside a friendly cyclone which would carry it along on a twenty-knot breeze in the coveted direction. We imagine that the few tons of coal would more frequently be expended in carrying the ship away from a region in which disaster is quite as likely to be encountered as material assistance to be rendered.

Possibly, knowing the destructive effects that these cyclones can work, our mariners have received them with too much distrust, and not sought to derive from them what little advantages they may offer. M. Fieron's book is directed towards creating a more favourable opinion of these atmospheric disturbances. The issue must be left to the expert, who has before his eyes Board of Trade inquiries and nautical assessors who may not share the hopeful views of the author. One very real source of danger on which the author does not appear to insist sufficiently is the swell which arises from the heavy seas, that accompany typhoons, tornadoes, &c. A well-found sailing vessel may withstand the force of the wind, after due precaution, but suffer grievously from heavy confused cross seas. This point and others of much importance are discussed in a pamphlet recently issued by Dr. Doberck, the director of the Hong Kong Observatory. The director has here incorporated the experience of many years' study gained in an observatory which exists mainly for the purposes of warning the mercantile marine against the dangers arising from the approach of typhoons and similar atmospheric disturbances. During the last thirteen years, the tracks of nearly 250 typhoons have been examined and discussed, from information supplied, either from ships at sea, or from fixed stations. The causes that produce variation from regularity, such as the geographical position of the origin of the storm, the presence of land masses in the path, the condition of the monsoon, &c., have been taken into account, with the result that successful prediction is generally secured, and rules for the management of vessels, under whatever conditions they are placed, have been formulated with scientific precision.